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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/653,507	09/02/2003	Gerald N. Coleman	02-470	3889
719	7590	07/27/2004	EXAMINER	
CATERPILLAR INC. 100 N.E. ADAMS STREET PATENT DEPT. PEORIA, IL 616296490				SOLIS, ERICK R
ART UNIT		PAPER NUMBER		
		3747		

DATE MAILED: 07/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>
	10/653,507	COLEMAN ET AL.
	<b>Examiner</b>	<b>Art Unit</b>
	Erick R Solis	3747

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 02 September 2003.
- 2a) This action is FINAL.                            2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-38 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 02 September 2003 is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All    b) Some \* c) None of:
    1. Certified copies of the priority documents have been received.
    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____.
3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>09/02/2003</u> .	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
	6) <input type="checkbox"/> Other: _____.

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claims 1-5,11-16,18,19,21,23-29,31 and 33-37 are rejected under 35 U.S.C. 102(e) as being anticipated by zur Loyer et al (US Patent 6561157). This reference teaches operating an engine which may operate in a PCCI mode wherein fuel is evenly distributed throughout the combustion chamber. An oxidant (air) is introduced into the combustion chamber as well as a diluent (EGR). Inherently the diluent (EGR) will have the effect of slowing down the combustion which will result in a longer combustion duration and lower combustion pressures.
2. Claims 1-5,11-16,18-21,23-29,31,33-35 are rejected under 35 U.S.C. 102(e) as being anticipated by Walter et al (US Patent 6701886). This reference teaches an engine which operates in an HCCI mode wherein fuel is evenly distributed throughout the combustion chamber. An oxidant (air) is introduced into the combustion chamber as well as a diluent (EGR). Inherently the diluent (EGR) will have the effect of slowing

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down the combustion which will result in a longer combustion duration and lower combustion pressures.

3. Claim 30 is rejected under 35 U.S.C. 102(b) as being anticipated by Ouellette et al (US Patent 5996558).

4. Claim 30 is rejected under 35 U.S.C. 102(b) as being anticipated by Hapeman (US Patent 5458292).

5. Claim 30 is rejected under 35 U.S.C. 102(b) as being anticipated by Shafer et al (US Patent 6725838).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

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consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 17,22 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over zur Loyer in view of Chanda et al. zur Loyer applies as above, but does not teach the technique of separating oxygen and nitrogen from air to aid in reducing pollutants. Chanda et al teach the use of supplying either and/or both of nitrogen into the combustion chamber to reduce such pollutants (see col. 7, lines 5-21). It would have been obvious to one of ordinary skill in the art to have supplied oxygen and /or nitrogen into the combustion chamber of zur Loyer, as taught by Chanda et al, since this would have aided in further reducing pollutants from the engine.

7. Claims 6-10, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over zur Loyer in view of Hapeman. zur Loyer applies as above, but does not teach using an injector with a plurality of holes for injecting fuel streams at different spray angles. Hapeman teaches a two stage injector which can vary the angle of fuel spray depending on engine load. It would have been obvious to have used a fuel injector in zur Loyer's engine, as taught by Hapeman because this would have provided for better combustion by allowing for better directional control of the fuel spray dependent on engine parameters.

8. Claims 6-10, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over zur Loyer in view of Shafer et al. zur Loyer applies as above, but does not teach using an injector with a plurality of holes for injecting fuel streams at different spray angles. Shafer et al teach a an HCCI engine with an injector which can vary the angle

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of fuel spray depending on type of combustion mode. It would have been obvious to have used a fuel injector in zur Loyer's engine, as taught by Hapeman because this would have provided for better combustion by allowing for better directional control of the fuel spray dependent on engine combustion mode.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erick R. Solis whose telephone number is (703) 308-2651. The examiner can normally be reached on Monday-Thursday.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0861.



Erick R. Solis  
Primary Examiner  
Art Unit 3747

ers  
July 23, 2004